

***What Is Claimed Is:***

1. A drilling device for producing undercut holes, said drilling device comprising:  
a drilling tool having an axis of rotation and a cutting portion arranged such that the cutting portion drills a hole having a longitudinal axis that is radially offset with respect to said axis of rotation; and  
a centering device operable to apply a lateral force to said drilling tool for moving said axis of rotation towards said longitudinal axis to cause said cutting portion to form an undercut in said hole.
2. The device of claim 1, wherein said centering device is arranged to apply said lateral force to move said axis of rotation to a position in which it is substantially in-line with said longitudinal axis.
3. The device of claim 1, wherein said centering device is axially slidable along said drilling tool between a non-operative position and an operative position in which it is received in said hole.
4. The device of claim 1, wherein said centering device is a tubular member mounted on said drilling tool.
5. The device of claim 4 wherein said tubular member is mounted for substantially non-rotational axial sliding movement relative to said axis of rotation of the drilling tool.
6. The device of claim 4, wherein said tubular member has an external surface having a surface area and said external surface is relieved to reduce said surface area.
7. The device of claim 6, wherein said tubular member has a longitudinal axis and said external surface is relieved by at least one recess therein that extends at an angle to said longitudinal axis.

8. The device of claim 1, further comprising a marking device connected with said centering device so as to be movable therewith for marking a surface in which an undercut hole is drilled.

9. The device of claim 1, further comprising a power-assisted mechanism for said centering device, said power-assisted mechanism being operable to move said centering device relative to said drilling tool to cause said centering device to apply said lateral force.

10. The device of claim 1, further comprising a support device securable to a drilling machine for supporting said machine against a surface of a part being drilled such that said support device engages said surface when the cutting portion is at a predetermined depth in said hole, said support device supporting said drilling machine such that said drilling tool is maintained at said predetermined depth while said centering device is operated to apply said lateral force whereby said undercut is formed at said predetermined depth.

11. The device of claim 10, wherein said support device is adjustable such that a plurality of said undercuts can be produced at desired depths in a hole.

12. The device of claim 10, wherein said support device comprises a telescoping tube arrangement including at least two telescopic tubes.

13. The drilling device of claim 1, wherein said drilling tool comprises a drill shaft that defines said axis of rotation and said centering device comprises a sleeve that at least partially surrounds a portion of said drill shaft and is axially slidable relative thereto, the drilling device further comprising at least one member connected with said sleeve by which an operator can cause said axial sliding movement of the sleeve for moving the sleeve into said hole alongside said drill shaft to apply said lateral force to the drilling tool.

14. The drilling device of claim 13, further comprising a tubular support to be mounted on a drilling machine for supporting the machine against a surface of a part being drilled at least when said undercut is being formed, said tubular support surrounding said sleeve and defining an aperture and said at least one member being disposed externally of said tubular

support and being connected with said sleeve via said aperture, whereby said sleeve can be moved substantially parallel to said axis of rotation and rotational movement of the sleeve is substantially prevented.

15. The drilling device of claim 1, wherein said centering device is mounted for substantially axial non-rotational movement relative to said axis of rotation.

16. A drilling device for producing undercut holes, said drilling device comprising:  
a drilling tool comprising a drill shaft that defines an axis of rotation of said drilling tool and a cutting portion carried at an end region of said drill shaft such that, in use, the cutting portion drills a hole having a longitudinal axis that is radially offset with respect to said axis of rotation; and

a centering device carried by said drilling tool, said centering device comprising an elongate member mounted so as to be slidable alongside said drill shaft into said hole to press against said drill shaft and apply a lateral force to said drill shaft, such that the axis of rotation is moved substantially into line with said longitudinal axis to cause said cutting portion to form an undercut in said hole, and at least one member connected with said elongate member by which a user of the drilling device can move said elongate member alongside said drill shaft.

17. The device of claim 16, wherein said elongate member is mounted such that the elongate member is substantially prevented from rotational movement relative to said drill shaft.

18. A drilling machine fitted with the drilling device of claim 1.

19. A drilling machine fitted with the drilling device of claim 16.

20. A method of producing an undercut hole, comprising:  
drilling a hole with a drilling tool that has a cutting portion arranged to produce a hole having a longitudinal axis that is radially offset with respect to an axis of rotation of said drilling tool; and

applying a lateral force to said drilling tool to cause said axis of rotation to move towards said longitudinal axis.

21. The method of claim 20, wherein said lateral force is applied by sliding an elongate centering device along said drilling tool towards said cutting portion thereof.

22. The method of claim 21, comprising substantially preventing rotational movement of said centering device relative to said drilling tool.

23. The method of claim 20, comprising providing a support device such that the support device engages a surface of a part being drilled when said cutting portion is at a predetermined depth in said hole and applying said lateral force when said support device engages said surface.

24. A method of producing an undercut hole, comprising:

drilling a hole with a drilling tool that comprises a drill shaft having an axis of rotation and a cutting head that is positioned such that said hole has a longitudinal axis that is radially offset with respect to said axis of rotation;

maintaining rotation of said drilling tool with said cutting head at a predetermined location in said hole and sliding an elongate member into said hole alongside between said drill shaft and a wall defining said hole to apply a lateral force to said drill shaft and thereby move said drill shaft to bring said axis of rotation substantially into line with said longitudinal axis causing said cutting head to widen said hole at said predetermined location to form an undercut.

25. The method of claim 24, further comprising substantially preventing rotation of said elongate member.

26. A drilling device for producing undercut holes, said drilling device comprising:

a drilling tool comprising a drill shaft that defines an axis of rotation of said drilling tool and a cutter carried at an end region of said drill shaft such that, in use, it drills a hole having a longitudinal axis that is radially offset with respect to said axis of rotation; and

a centering device operable to apply a lateral force to said drilling tool for moving said axis of rotation towards said longitudinal axis to cause said cutter to form an undercut in a said hole, said centering device including;

a centering member that is movable from a non-operative position outside of said hole to an operative position inside said hole in which the member is positioned between said drill shaft and a wall defining said hole so as to provide said lateral force;

an operating device connected with said centering member by which an operator can move said centering member from said non-operative position to said operative position;

a depth stop device by which a drilling depth of said hole is set; and

a control device for said operating device, said control device being configured to prevent movement of said operating device by which said centering member is moved from said non-operative position to said operative position until said drilling tool has drilled said hole to said drilling depth set by said depth stop device.

27. The device of claim 26, wherein said control device comprises a gate member defining a slot for receiving a portion of said operating device, said slot being configured to prevent movement of said portion that would move said centering member from said non-operative to said operative position until said drilling tool has drilled said hole to said drilling depth set by said depth stop device.

28. The device of claim 26, wherein said centering device further comprises a support device to be mounted to a drilling machine and support the machine against a part being drilled, at least when said undercut is being formed,

said support device comprising a first support member and a second support member telescopically connected with said first member,

said first support member having a first part of said control device which first part is provided with an aperture through which a portion of said operating device extends, said aperture defining a first movement path for said portion of the operating device, said first movement path having a first portion configured such that when said portion of the operating device is received therein said operating device cannot move said centering member from said non-operative to said operative position and a second portion configured such that when

said portion of the operating device is received therein said operating device can move said centering member from said non-operative to said operative position, and

    said second support member having a second part of said control device which second part is provided with an aperture through which said portion of the operating device extends, said aperture of said second part defining a second path along which said portion of the operating device can move, said second path having a first portion configured such that when said portion of said operating device is received therein said portion of said operating device is held in said first portion of said first movement path and a second portion configured such that when said portion of the operating device is received therein, said portion of said operating device can be moved from said first portion of said first movement path into said second portion of said first movement path.

29.     The device of claim 28, wherein said first movement path is defined by a substantially L-shaped aperture.

30.     The device of claim 28, wherein said second path includes a third portion extending from said second portion and aligned with said second portion of the first movement path, said portion of the operating device moving along said third portion as it moves along said second portion of the first movement path.

31.     The device of claim 30, wherein said second path is substantially U-shaped.

32.     The device of claim 28, wherein said first and second support members are tubular members and said aperture defining said first movement path is a slot defined by said first tubular support member.

33.     The device of claim 28, wherein said aperture defining said second path is defined by a member secured to said second support member.

34.     The device of claim 28, wherein said first support member is connected with said drilling machine via said second support member and said second support member moves

telescopically relative to said first support member when said drilling tool is drilling said hole.

35. The drilling device of claim 26, further comprising a support device to be mounted on a drilling machine and support the machine against a part being drilled, at least when said undercut is being formed, said support device comprising a first support member and a second support member telescopically connected with said first support member such that said support device has a length that is variable and arranged such that said length reduces during drilling of said hole,

    said first support member and said second support member each having a part of said control device, said parts of the control device each having an aperture through which a portion of said operating device extends which apertures define respective movement paths along which said portion of the operating device can pass, each movement path having an elongate portion extending substantially parallel to said axis of rotation and a transverse extending portion, said portion of the operating device being held in the transverse extending portion of said first support member movement path by said elongate portion of said second support member movement path as the second support member moves relative to said support member and said length reduces and being permitted to move from said transverse extending portion of the first support movement path into the elongate portion thereof when said second support member has moved relative to said first support member a distance corresponding to said drilling depth so as to bring said transverse extending portion of said second support movement path into overlying relationship with said transverse extending portion of said first support movement path.